

**DOCUMENT DELIVERY SYSTEM AND RELATED METHOD FOR GENERATING AND  
DELIVERING PERSONALIZED ACTIVITY PUBLICATIONS**

**RELATED INVENTIONS:**

- 5           The present invention is a continuation-in-part of U.S. Application No. 09/325,040 filed on June 7, 1999 titled "Document Delivery System for Automatically Printing a Document on a Printing Device", by Brewster, et al.

**TECHNICAL FIELD:**

- 10           This invention generally relates to the printing field and, more particularly, to a document delivery system facilitating aggregation of periodic content.

**BACKGROUND:**

- 15           In the mid-1400's, Johann Gutenberg revolutionized how information is disseminated through his invention of the movable type press. With the publication of the Mazarin Bible, documents which were once held in the exclusive domain of a chosen few were now widely available to the masses. Nearly 550 years later, the mass media revolution that Gutenberg started is  
20           alive and well, complete with newspapers such as the New York Times and the Washington Post, magazines such as Newsweek and Sports Illustrated, and literally thousands upon thousands of other publications.

- While these thousands of publications cover a wide range of interests, from news to sports to fashion to model rocketry, they have one thing in  
25           common: they are intended to be read by a mass market. Unlike the pre-Gutenberg days, where a document would literally be read by only one person of a very small number of people, it is not economically viable for today's publications to have such a small readership, due at least in part to high marketing, production and distribution costs. In fact, many of today's  
30           publications are funded to a very large extent by the advertising contained within them. These advertisers are attracted to publications that can

consistently deliver a large, reliable audience of consumers that will be exposed to their advertising.

While this mass-market publication model has worked well for hundreds of years, it is not without its problems. One such problem is that a typical reader of a publication has a wide variety of interests, and no single mass market publication will be able to satisfy all of these interests. For example, a reader who is interested in international news, golf, fly-fishing, Genealogy, and computers may have to subscribe to several different publications to satisfy these interests. Of course, since these publications are intended for the mass market, they will also contain a significant amount of material that our reader is not interested in and will not read. It goes without saying that if there is a significant amount of material a read isn't reading, there is a significant amount of advertising that the reader isn't reading either – as well as a significant amount of paper that is wasted. Advertisers know this, and agree to pay considerably less to a mass market magazine or newspaper per 1000 exposures to their ad than they would pay to a direct-mail generator that can provide a more specific guarantee that the people exposed to their ad are of a demographic group that will be much more likely to read and be receptive to their ad.

In addition, it is neither cost-effective nor time effective for most readers to subscribe to and/or read a large number of publications. Generally, the typical reader will only subscribe to a few publications that are of the most interest to them. The reduced readership level of the publications our typical reader chooses not to subscribe to, even though she might be interested in at least some of the editorial and advertising content contained inside, means that the publication receives less subscription and advertising revenue than they otherwise would. If many other readers make the same decision, the continued health of the publication may be in jeopardy, and the publication may be forced out of business. In fact, many publications do go out of business yearly for failing to attract a sustaining number of advertisers and readers – even if there are a large number of readers that would be interested in reading their publication, and a corresponding number of advertisers

anxious to have these readers exposed to their ads. In general, publications that fail to attract a substantial mass market of people willing to pay for and/or read them cease publication. This is a shame, since many of these publications would enrich the diversity of information available to all readers, and would provide an avenue for lesser known writers and artists to practice their wares.

In more recent years, a new type of publication has emerged: the electronic publication. Readers of these publications typically sign into the Internet through their computer, and read the publications online. Some of these publications, such as CNN.com and pointcast.com, allow users to state personal preference(s) on what type of material they would like to read. Often, these personalized publications include advertising, usually in the form of a banner ad that is placed on or along a periphery of the visual display (top, bottom, side, etc.).

While these electronic publications have been an interesting development in the distribution of information, they still represent only a tiny fraction of the information that is published under the more traditional post-Gutenberg model. Many readers of these electronic publications complain that they are very difficult to read (on the video display), especially for long periods of time. While it might be convenient for a reader to sign onto the Internet to look at the CNN.com web site for a brief summary of late breaking news, this reader would most likely only spend a few minutes at the site, and would likely still subscribe to the more traditional print media such as Newsweek or the Washington Post. They would also likely spend significantly more time reading the more traditional printed publication than they would spend reading the electronic publication, and correspondingly, spend more time being exposed to the ads in the traditional printed publication. Accordingly, printed publications continue to flourish today – more than five centuries after Gutenberg made them possible – and after more than a decade after the innovation of the electronic publication.

While these printed publications have certainly benefited modern society, no significant attempt has been made thus far to solve the underlying

problems with these publications discussed above. Just such a solution is provided herein.

#### SUMMARY OF THE INVENTION:

- 5           A method for generating a publication comprises receiving a publication profile from a requesting user, creating a lesson plan based on at least a subset of a plurality of information in accordance with the received publication profile, and periodically generating the publication for delivery to at least the requesting user from at least a subset of content received from one or more content providers dynamically selected to satisfy at least a subset of the lesson plan.
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#### BRIEF DESCRIPTION OF THE DRAWINGS:

- 15           Fig. 1 shows a block diagram of a document delivery system of one embodiment of the invention;
- Figs. 2-4 illustrate flow charts detailing the operation of the transmission module and the printing module of the document delivery system of one embodiment of the invention;
- 20           Fig. 5 illustrates how user profile information is acquired from a user in one embodiment of the invention;
- Fig. 6 shows how user profile information is acquired from a user in one embodiment of the invention;
- Fig. 7 shows a print schedule for the delivery of documents in one embodiment of the invention;
- 25           Fig. 8 shows how the print schedule of Fig. 7 can be modified by the user;
- Figs. 9A-9B shows a document printed by the printing device according to one embodiment of the invention;
- 30           Fig. 10 shows a document printed by the printing device according to one embodiment of the invention;
- Figs. 11A-11D show a document printed by the printing device according to one embodiment of the invention;

Fig. 12 shows a document printed by the printing device according to one embodiment of the invention;

Fig. 13 illustrates a block diagram of an example print manager, according to one embodiment of the present invention;

5 Fig. 14 is a block diagram of an example edit module, according to one embodiment of the present invention;

Fig. 15 is a block diagram of an example knowledge module, according to one embodiment of the present invention;

10 Fig. 16 is a flow chart of an example method for dynamically generating a personalized activity publication, according to one aspect of the present invention;

Fig. 17 is a graphical illustration of an example lesson plan, according to one aspect of the present invention;

15 Fig. 18 is a graphical illustration of an example educational development profile, suitable for use by the edit module;

Fig. 19 illustrates a block diagram of an example storage medium comprising a plurality of executable instructions including at least a subset of which that, when executed, implement an edit module according to Fig. 14.

## 20 DETAILED DESCRIPTION:

Fig. 1 illustrates a block diagram of a document delivery system of one embodiment of the invention. Document delivery system 10 contains document server 100. In the preferred embodiment, document server 100 is operatively coupled via network 200 to a variety of personal computers, 25 printing devices, and other electronic devices, collectively referred to as devices 300. Document server 100 contains edit module 120, transmission module 150 and knowledge module 170. Edit module 120 receives inputs from one or more content providers 50, and/or one or more advertising providers 80. Distribution module 400 is operatively coupled to document 30 server 100. In a preferred embodiment, document server 100 is a minicomputer/server, such as an HP 9000 server sold by the Hewlett-Packard Company, although those skilled in the art will appreciate that document

server 100 could be any type of other computing or electronic device(s) that performs the functions described herein and still fall within the spirit and scope of the invention. Network 200 is preferably the Internet, although an Intranet, local area network, or other type of public or private network, either wired  
5 (e.g., telephone, cable TV, etc.) or wireless (e.g., satellite, radio, cell phone, etc.), could also or additionally be used.

Devices 300 are shown in Fig. 1 as being capable of being configured in a wide variety of ways. For example, personal computer 310 is shown connected to printing device 320, which prints document 10320 for user  
10 20320. Personal computer 310 is operatively coupled to network 200. In contrast, printing device 330, which prints document 10330 for user 20330, is operatively coupled to network 200 without an intervening personal computer or other electronic device. Printing device 350, which prints document 10350 for user 20350, is shown connected to electronic device 340, which could be a  
15 set top box, television set, palmtop personal digital assistant (PDA) or other type of electronic device that is operatively coupled to network 200. Finally, printing device 370, which prints document 10370 for user 20370, is connected to electronic device 360, which is operatively connected to network 200. The printing devices shown in Fig. 1 could be printers, such as the HP  
20 DeskJet 890 printer, HP LaserJet V printer, or other models of printers manufactured by HP or others; so-called "mopiers" or other multi-function printing devices that can print, fax, scan, and/or copy, or any other device capable of transferring information to a printable media such as plain paper, specialty paper, transparencies, or other media capable of tangibly receiving  
25 such information and which can be easily carried about by the user.

As shown, document delivery system 100 includes a printing module 380 and a transmission module 150. Transmission module is preferably located with document server 100, and is used to transmit a personalized publication to one or more requesting users. As Fig. 1 shows, printing module  
30 380 may well be located in any of the devices 300, such as in personal computer 310, printing device 330, or electronic device 340, operatively coupled via network 200 to document server 100, or it could be located within

document server 100 itself, such as in knowledge module 170. According to one embodiment of the invention, transmission module 150 and printing module 380 represent software functions, stored in one or more storage device(s), that execute on suitably programmed microprocessor(s) within a device 300 and/or document server 100. It will be appreciated, however, that special purpose hardware or other mechanisms could be employed to implement the innovative features and functions described below.

Fig. 13 illustrates a block diagram of an example printing module 380 is presented. According to one embodiment, printing module 380 resides within one or more of devices 300 and, in response to user interaction with a user interface (not shown), schedules and manages the delivery of one or more documents to a printing device. Any of a number of user interfaces may be used to utilize the features and functions of printing module 380. According to a preferred embodiment, to be described more fully below, a web page is projected to a device 300 by document server 100, content provider 50 and/or advertisers 80, wherein the web page includes one or more iconic function calls to one or more of the features/functions provided by printing module 380.

As shown in Fig. 13, printing module 380 includes one or more controller(s) 402, a print function 404, a scheduler function 406, a document translation/interpretation function 408, a memory/storage system 410, an input/output (I/O) interface 412, and optionally one or more applications 413, each coupled as shown. It will be appreciated that, although denoted as separate functional blocks, one or more elements 402-413 may well be combined without deviating from the spirit and scope of the present invention. Moreover, although depicted in accordance with a hardware paradigm, those skilled in the art will appreciate that printing module 380 and its associated elements 402-413 may well be embodied as a series of executable instructions which, when executed by a host processor of devices 300, implement the features and functions of printing module 380 to be discussed below.

As shown, controller(s) 402 selectively invoke one or more functions 404-408 and/or applications 413 in response to user interaction with a user

interface, e.g., a web page. According to one embodiment, the user interface includes iconic selectors, e.g., buttons, that when selected by the user cause controller 402 to selectively invoke an instance of a function associated with the iconic selector. In this regard, controller 402 communicates with external  
5 elements via input/output (I/O) interface(s) 412. In an alternate embodiment, controller 402 provides a user with a user interface from applications 413.

As used herein, I/O interface(s) 412 are intended to include one or more of any of a number of communication interfaces known in the art including, but not limited to, a direct connect communication interface (e.g., a  
10 serial interface, a parallel interface, a Universal Serial Bus (USB), an Advanced Graphic Port (AGP), etc.), a local area network interface (e.g., an Ethernet interface, a Token Ring interface, etc.), or a wide area network interface. In this regard, printing module 380 may communicate with any of a number of external and remote devices using an appropriate one of a plurality  
15 of wired and/or wireless I/O interfaces 413.

Automated print function 404 is selectively invoked by controller 402 in response to a user indication to immediately print a document (e.g., within the next several seconds) without first viewing or displaying the document. According to one embodiment, a user interface projected by printing module  
20 380 or from an external source (e.g., document server 100) includes an iconic selector associated with one or more documents to invoke the automated print function 404 to print the one or more documents. Insofar as selection of the iconic selector associated with the one or more documents automatically causes the documents to be queued for printing (e.g., within the subsequent  
25 several seconds), the iconic selector is referred to herein as an "automated print" icon, or an "instant print" icon.

When the automated print icon associated with one or more documents is selected by a user, the user interface provides controller 402 with information regarding the associated one or more documents. According to  
30 one implementation, user interface provides controller 402 with a name/identifier and storage location of the one or more documents. Controller 402 provides the name/identifier and location information to automated print



function 404 to queue the document for printing. As will be described in more detail below, automated print function generates and issues a request to retrieve the identified document(s) from the identified storage location via I/O interface 412. The retrieved documents are stored in memory locations 414A, 414B, etc. of memory 410. Once retrieved, document translation/interpretation function 408 is selectively invoked to interpret/translate and print the retrieved document. According to one implementation, the retrieved documents are queued and printed substantially instantaneously (e.g., within the subsequent several seconds). In alternate embodiments, the retrieved document(s) are printed according to a print schedule defined by the user.

According to one aspect of the invention, to be described more fully below, the document associated with an iconic selector is retrieved from a provider into memory 410 of print module 380 and immediately printed without invoking an application associated with the document. That is, translation/interpretation function 408 reads the stored document(s), interprets the textual, image, formatting, etc. content of the document(s) to print the document on an operatively coupled printer without having to invoke the application associated with the retrieved document(s), and without having to display the document(s) to the user prior to printing.

In an alternate embodiment, an application 413 (e.g., Microsoft Word, Adobe Acrobat, etc.) associated with the document is invoked by controller 402 to print the document, but neither the document nor the application 413 are displayed to the user so, from the user's perspective, the application is not launched. In either case, automated print function 404 enables a user to immediately print a remote document without having to manually download, launch and print the document, thereby providing the user with the convenience and selection of electronic publications, with the physical reading experience introduced by the Gutenberg press.

The scheduling function 406 enables a user to establish a print schedule 390 for documents of interest. According to one embodiment of the present invention, scheduling function 406 is selectively invoked by controller

402 in response to a user's indication to add the document to a print schedule 390. As shown in Fig. 1, the printing schedule 390 may be located in devices 300, document server 100 or any other accessible location.

Fig. 14 illustrates a block diagram of an example edit module.

- 5 According to one embodiment, edit module 120 resides within document delivery server 100 and, in response to a print schedule 390 developed by a print module 380, assembles content from one or more content providers into a personalized publication. In accordance with one aspect of the present invention, edit module 120 selectively generates a personalized activity
- 10 publication targeted to satisfy a lesson plan dynamically generated from one or more of a user profile, a publication profile, an educational development profile and the like. According to one embodiment, such information profiles (e.g., user profile, publication profile, educational development profile) are accessed through knowledge module 170. According to an alternate
- 15 embodiment, the information profiles are stored in disparate storage devices (not shown) throughout document delivery system 10 such as, for example, knowledge module 170, edit module 120, and/or devices 300.

- In accordance with the illustrated example embodiment of Fig. 14, edit module 120 is depicted comprising one or more controller(s) 502, publishing
- 20 agent 504, virtual editor 506, memory space 508 and one or more input/output (I/O) interface(s) 510, each coupled as depicted. According to one implementation of the invention, edit module 120 may well contain one or more application(s) 512 executable by controller(s) 502. Indeed, according to one embodiment to be described more fully below, edit module 120 includes
- 25 an innovative set of publishing tools 512 that enable a producer (e.g., a registered user) to establish a publication profile that is used by edit module 120 to automatically generate a lesson plan from which it produces a personalized activity publication on behalf of the requesting user. It will be appreciated that although depicted as separate and distinct functional entities,
- 30 one or more functional blocks 502-510 may well be combined into multi-functional entities. Moreover, although depicted in accordance with a hardware paradigm, those skilled in the art will appreciate that edit module

120 and its constituent elements 502-510 may well be embodied as a series of executable instructions which, when executed by a host processor, implement the features and functions of edit module 120 to be discussed below.

5 As shown, controller(s) 502 selectively invoke one or more of the virtual editor 506 to generate a custom document for a requesting and/or subscribing user, or publishing agent 504 to complete the layout and optimize the delivery schedule of such custom documents. Controller(s) 502 may initiate construction and/or delivery of a custom document in response to user  
10 interaction with a user interface (e.g., a web page), or to accommodate a user-selected delivery schedule. In this regard, controller 502 communicates with external applications (e.g., web page) or other elements (e.g., a user profile) via input/output (I/O) interface(s) 510. In an alternate embodiment, controller 502 provides a user with a user interface with which to request/build  
15 a custom document using one or more of applications 512. But for implementation of the teachings of the present invention, controller(s) 502 are intended to represent any of a broad range of control devices known in the art including, but not limited to, a programmable logic array (PLA), microprocessor, special purpose controller, application specific integrated  
20 circuit (ASIC), and the like. In an alternate embodiment, controller(s) 502 are embodied as a series of executable instructions which, when executed, implement the control logic described herein.

Memory device 508 and I/O interface(s) 510 are each intended to represent such devices commonly known in the art. I/O interface(s) 510, in  
25 particular, are intended to include one or more of any of a number of communication interfaces known in the art including, but not limited to, a direct connect communication interface (e.g., a serial interface, a parallel interface, a Universal Serial Bus (USB), an Advanced Graphic Port (AGP), etc.), a local area network interface (e.g., an Ethernet interface, a Token Ring  
30 interface, etc.), or a wide area network interface. In this regard, edit module 120 may communicate with any of a number of external and remote devices

using an appropriate one of a plurality of wired and/or wireless I/O interfaces 510.

According to one aspect of the present invention, virtual editor 506 personalizes publications for a unique, composite publication based on a number of factors. As shown, virtual editor 506 includes a content manager 518 and a construction agent 520. The content manager 518 includes an analysis/wrapper agent 522, a contract administrator function 524 and a transaction agent 526. As editor module 120 receives content from one or more content providers, content manager 518 is selectively invoked by controller(s) 502. The analysis/wrapper agent 522 analyzes the received content and categorizes it based on any one or more of a number of attributes including, source, subject matter, length, cost, etc. In addition, analysis/wrapper agent 522 encapsulates the content object in a wrapper with a unique identifier. It will be appreciated, based on the description to follow, that the encapsulating wrapper enables virtual sensors (not shown) in the document distribution system to accurately track distribution, receipt and disposition of content objects. According to one embodiment, virtual sensors are embedded within printing modules 380 to track distribution, receipt and disposition of encapsulated content objects.

According to one implementation, the contract administrator 524 is a database driven component that manages all of the contractual obligations of the users (subscribers, content providers, etc.) of the document delivery system. According to one implementation, contract administrator 524 maintains royalty calculation and display agreements for select content providers (e.g., artists), the advertising rates for other content providers (e.g., advertisers), subscription information for select users, and the like. Periodically, contract administrator 524 accesses one or more content provider databases to identify content object distribution, to compute royalty payments, advertising bills and subscription bills for distribution to appropriate users via the transaction agent 526. In this regard, contract administrator 524 ensures that contractual obligations of the document delivery system are adhered to.

Transaction agent 526 is the primary interface between the document delivery system and a public/private e-commerce financial system (e.g., the CheckFree™ financial network offered by CheckFree Corporation). As introduced above, the transaction agent 526 is responsible for executing payments and account credit/debit transactions with user accounts based, at least in part, on the distribution of content objects in accordance with the terms and conditions maintained in contract administrator 524. It should be noted that although depicted as an element of edit module 120, those skilled in the art will appreciate that content manager 518 may well be deployed as an separate and independent functional entity without deviating from the spirit and scope of the present invention.

The construction agent 520 of virtual editor 506 extracts content objects to generate a custom document according to one or more key contributors. As used herein, the key contributors include one or more of a requesting/subscribing user's interests, demographics, seasonality, document server requirements, and content provider usage criteria, and the like. As will be described in greater detail below, construction agent 520 extracts content objects which are likely to be of interest to a particular user and generates a personalized publication for that user. The construction agent 520 utilizes information received via overt and covert processes of document delivery system 10 to log a user's interaction and disposition of received material, as well as soliciting feedback from the user, to improve the user's satisfaction with subsequent personalized publications. Information gathered as a result of these overt/covert processes are used by construction agent 520 to update a user profile associated with the user, which is accessed when generating a personalized publication. In this regard, construction agent 520 performs functions commonly associated with a physical editor of, say, a magazine: publication content decisions, layout and format decisions, advertising and the like, yet it factors in other key information such as personal preferences to generate personalized publications for up to millions of individuals. Once construction agent 520 has extracted content objects to generate the

publication, it is passed to publishing agent 504, to finalize layout and schedule delivery of the personalized publication to the intended recipient(s).

In accordance with the illustrated example embodiment, publishing agent 504 is presented comprising schedule manager 514 and layout manager 516. As will be described in greater detail below, layout manager 516 receives the content objects from construction manager 506 and finalizes at least a partial layout of the personalized publication. According to one aspect of the invention, layout manager 516 maintains a record of the time required to complete at least a partial layout of the publication in order to determine the complexity of the personalized publication. This indicator of complexity is subsequently used by publishing agent 504 in estimating the time required to layout future publications containing one or more of the same content objects, and to aid schedule manager 514 in estimating the time required to complete publication.

Once layout manager 516 has completed at least a partial layout of the publication, schedule manager 514 completes the publication layout (e.g., with last minute content objects, or updates to such objects), and schedules delivery of the personalized publication. According to one embodiment, schedule manager 514 utilizes information from a number of available sources to schedule delivery of the publication. More particularly, schedule manager 514 utilizes information from the user's personal profile, a complexity measure from layout manager 516, and an indication from printing devices associated with the user confirming that an adequate amount and type of media is available for printing the publication. Based, at least in part, on such information, schedule manager 514 works to establish an optimum publication schedule for one or more personalized publications.

As introduced above, edit module 120 includes an innovative publishing tool set 512 from which a producer can register to publish publications utilizing the innovative features of document server 100. According to one implementation, publishing tool set 512 includes a user interface (UI) which, when invoked, enables a user to create and/or update a publication profile (640). The publication profile includes information

regarding one or more of the publication title, producer contact information, the topic or genre of the publication, the scope of the publication, the content providers and/or advertising providers to use, publication layout information, a publication schedule, and the like. The publication profile created/updated by the publishing tool set 512 is maintained in knowledge module 170.

According to one aspect of the present invention, publishing tool set 512 includes an innovative personalized activity publication publishing tool 513 that dynamically generates a personalized activity publication for delivery to at least the requesting user. In accordance with this aspect of the present invention, personalized activity publication tool 513 dynamically generates a lesson plan from one or more of a publication profile, user profile, education development profile, and the like. The lesson plan is utilized by virtual editor 506 and publishing agent 504 to assemble content and format a personalized activity publication that satisfies at least a subset of the content of the lesson plan. According to one implementation, additional personalized activity publications are prepared and periodically published until all of the topics of the lesson plan are exhausted. In addition to the automated lesson plan generation, personalized activity publication tool 513 enables a user to manually generate a lesson plan from a number of topics provided in the educational development profile (650), or from other topical information found, for example, on the Internet. The publishing agent 504 recognizes the publication as a personalized activity publication and formats the content of the publication into one or more subsets consisting of, for example, an instructor subset of content, a student subset of content, and the like to assist the parent/instructor/coach in preparing for and presenting the activity publication. According to one implementation, the instructor subset of content may well comprise the first page of the publication, with the student subset of content comprising subsequent pages. It is to be appreciated that the personalized activity publication tool 513 offers a powerful, yet flexible tool to enable parents, teachers, coaches and the like to generate activity based educational material for students/players of all ages, backgrounds and ability.

In addition to the registration, publication profile, and personalized activity publication interfaces, publishing tool set 512 may also include other advanced publishing tools that, for example, aid the producer in selecting an appropriate publication layout, provide readership demographic information for targeted advertising, and the like. Once the publication profile is set, publishing agent 504 and/or edit module 506 establish publication schedules based, at least in part, on the information maintained in the publication profile to automatically schedule generation and publication of publications without further invocation/input from the producer. Thus, according to this innovative aspect of the present invention, the producer merely establishes a publication profile from which document server 100 automatically gathers appropriate content to generate a publication on a schedule dictated by the publication profile.

Fig. 15 illustrates an example knowledge module 170, according to one embodiment of the present invention. As shown, knowledge module 170 comprises user profile information 602, content provider information 620, contract administrator information 630, publication profile information 640, educational development profile information 650 and optionally printing module 380 and printing schedule 390. Although depicted as being co-located, those skilled in the art will appreciate that knowledge module 170 may well be implemented as a "loose" affiliation of otherwise disparate information sources remotely located throughout the document delivery system. In such an implementation, knowledge module 170 includes logic to access/retrieve information from such information sources to support the document delivery services described herein.

As introduced above, document delivery system 10 in general, and edit module 120 in particular, continuously acquires and/or solicits information from users requesting personalized publications from the document delivery system, in order to better anticipate the informational and advertising (cumulatively, content) needs of the user. In this regard, any of a number of personal information attributes are maintained in user profile information database 602.



Content provider profile 620 includes information received from virtual sensors, distributed throughout the document delivery system, regarding content object distribution, receipt and user disposition. Contract administrator profile 630 includes information regarding the terms of use, usage/layout requirements, fee structures/schedules and the like for each of the content providers that provide content objects to document delivery system 10. Publication profile 640 includes information provided by a publisher from which a document server (e.g., 100) automatically generates and distributes publications.

10 Educational development profile 650 includes information leveraged by edit module 120 to dynamically generate a lesson plan based, at least in part, on information contained in one or more of the user profile information 602, the publication profile 640, and the like. According to one implementation, educational development profile 650 includes suggested educational topics and activities associated with a number of educational and general interest subjects which may be of interest to the requesting user - a conclusion drawn from information contained in the user profile and/or the publication profile. In an alternate implementation, edit module 120 provides a user interface, e.g., a projected web page, which enables a user to select one or more topics from the educational development profile 650 to generate the lesson plan from which the personalized activity publication is generated.

Although depicted as a functional element of document server 100, those skilled in the art will appreciate that knowledge module 170 may well be utilized by other document servers (not shown) in document delivery system 10, or may well be integrated in another and/or stand-alone element of document delivery system 10 without deviating from the scope or spirit of the present invention.

Turning to Figs. 2-4, flowcharts detailing the operation of transmission module 150 and a first mode of operation of printing module 380 are presented, according to one embodiment of the invention. In Figs. 2-4, the flow diagram shown in the left column is executed by transmission module

150 of document server 100, and the flow diagram in the right column is executed by printing module 380.

Referring now to Fig. 2, the flow diagram for transmission module 150 starts in block 1000, and the flow diagram for printing module 380 starts in block 2000. Since there is a great deal of interaction between these two flow diagrams, as represented by dashed lines connecting the two columns, the operation of the two flow diagrams will be described simultaneously.

In block 2100, user profile data is sent to document server 100 to be stored in the user profile. This user profile data can take on many different forms, from simple to very detailed. Fig. 5 shows a very simply acquisition of user profile data, such as that used in an Instant Delivery service, originally offered by Hewlett-Packard Company. In this service, only three pieces of information are stored in the user profile: type of printer, email address, and whether the service provider can contact the user. Fig. 6 shows a more complicated user profile than that currently used in the Instant Delivery service, which includes the user's name, email address, company name, city, state, country, zip or postal code, phone number, printer information, and areas of interest. Those skilled in the art will appreciate that more or less user profile data from those shown in Figs. 5 and 6 could be sent to transmission module 150 in block 2100 and still fall within the spirit and scope of the invention, and that at least some of this information could come from a source other than a user. For example, the user profile data could also include household income, age, and sex of the user, among other things. In any event, block 1100 receives the user profile data sent by block 2100. Block 1200 stores the user profile data, preferably in knowledge module 170. Alternately, the user profile data could be stored in device 300 or in some other local or remote location.

Block 2200 checks to see whether a document should be received from document server 100. This is done by checking print schedule 390 which is preferably stored on a device 300 or document server 100, but may be stored in some other local or remote location. Printing schedule 930 preferably contains information that can be used to determine when

documents should be printed by the printing device, such as upon document creation, user requested time, lapse of specified time period, and/or occurrence of one or more external events (e.g., a stock price or index reaching a specified value, a final score of a sporting event, etc.). Printing schedule 390 may be associated with an individual user, a device or a group of users and/or devices. In addition, each entry of printing schedule 390 could result in the printing of one or more documents.

Fig. 7 shows one example of printing schedule 390, of the type that might be used in an enhanced version of the Instant Delivery service. In this example, the title of delivery, delivery schedule, next delivery data and time, and the last deliver status are shown. Preferably, the user can select what time a document should be printed, whether it should be printed on a specific day of the week or month, weekdays, or weekends, and whether the printing schedule should expire after a specific period of time or continue indefinitely.

Referring again to Fig. 2, printing module 380 monitors printing schedule 390 to see if a document should be requested from document server 100 or from another source. When block 2200 determines that a document should be requested from document server 100 or from another source, block 2200 is answered affirmatively, and block 2300 automatically requests the document without user intervention from server 100 or from another source, as will be described in greater detail below. Note that if printing module 380 is located on device 300, block 2200 operates in a "pull" mode – where the document is "pulled" from document server 100 or another source to device 300. However, if printing module 380 is located remotely from device 300, such as in document server 100, block 2200 operates in a "push" mode – where the document is "pushed" from document server 100 or another source to device 300. If block 2300 determines that the document is located on document server 100 or at another source accessible via network 200, and if device 300 is currently in a disconnected state where it is not operatively coupled to the network 200, block 2300 will sign on to or otherwise enter a connected state with network 200, so that device 300 is operatively coupled to network 200.

Meanwhile, block 1300 checks to see if a document has been requested from printing module 380 in block 2300. Once it determines that such a document has been requested, block 1400 generates the document for printing module 380. Block 1500 then sends the document to printing module 380. Block 2400 checks to see whether a document has been received from document server 100 via block 1500. Once such a document has been received, block 2500 automatically prints the document, without user intervention, on a printing device. The term "without user intervention" means that a user is not directly involved in the printing operation; the document is sent automatically to a device 300 to be printed out by a printing device. According to this mode of operation, the user does not press any print buttons or otherwise be directly involved in the printing process; in fact, the user may not even be present in the same room, city, state, or country as device 300 during the printing operation. The printing operation automatically occurs in an unattended state – regardless of whether the user is present or not. In addition, if print schedule 390 is stored in a device-independent manner, such as on document server 100, a traveling user could "log in" to document server 100 and have his or her customized document sent to a device 300 that is convenient to the user's current location.

Referring now to Fig. 3, block 2600 checks to see whether the document printed successfully. If not, block 2800 performs error handling, such as attempting to print the document again, notifying the user that the printing device is out of paper or has some other error condition, or simply deciding not to print the document. When the document prints successfully, block 2900 informs document server 100 that the document printed successfully. Block 1600 waits for an indication from printing module 380 that the document did print successfully. When such an indication is received, block 1700 updates the user profile with this information.

It will be appreciated that not all of the blocks in Figs. 2-4 need be implemented, or implemented according to the order denoted, to fall within the spirit and scope of the present invention. More specifically, according to one

implementation, flow of control moves from block 2600 to block 4100 of Fig. 4, as will be discussed later, and from block 1500 back to block 1300 of Fig. 2.

An alternate embodiment has been contemplated where other information is transmitted back to document server 100 in block 2900 to  
5 update the user profile preferably stored in knowledge module 170. This other information could be ink usage (total usage or usage broken out by ink color), printable media usage (number of pages printed, type of media used, etc.), or other types of information. In addition, another alternate embodiment has been contemplated where some or all of the information contained in the user  
10 profile stored in knowledge module 170 came from a source other than the user via printing module 380. For example, publicly or privately available information about the user, and/or the devices 300 he/she/they use, could be acquired from a wide variety of different sources and inserted into the user profile preferably stored in knowledge module 170.

15 Block 1800 examines the user profile preferably stored in knowledge module 170 to determine whether a product subsidy should be provide to the user. For example, if the information in the user profile indicates that this user has printed off his 1000<sup>th</sup> document, such as a "preferred" document that contains advertising from advertising providers 80 or is otherwise under the control of edit module 120, providing a product subsidy to the user may be  
20 warranted. For purposes of this invention, a "product subsidy" could be a print consumable or other product. A "print consumable" is an inkjet cartridge for an inkjet printer, ink for such an inkjet cartridge, a toner cartridge for a laser printer, toner for such a toner cartridge, or any other product or substance that  
25 is depleted when a document gets printed, including printer ribbons, etc. Note that the "ink" referred to above would typically be of a permanent variety, but erasable ink, such as that sold by the E Ink Company, could also be used.

Note that the product subsidy referred to herein is preferably funded at least in part by advertising revenue received from advertising providers 80  
30 (Fig. 1), but an embodiment has been contemplated where the product subsidy is funded at least in part from the distribution revenue received from content providers 50 (Fig. 1). In either case, information (such as statistical

information) about what was printed by whom is preferably provided to content providers 50 and/or advertising providers 80 – preferably as a document that is automatically sent to one or more printing devices according to the teachings of this invention.

- 5 Other forms of products that are contemplated to be subsidized by this invention include printable media, such as plain paper, specialty paper, transparencies, and the like, and may also include devices 300 such as printing devices, electronic devices, and personal computers. In fact, alternate embodiments have been contemplated where other products, such as a subscription price to a document, or even a product not directly related to the document delivery system shown herein, such as soap or dog food, are subsidized. If block 1800 determines that such a subsidy is warranted, block 1900 requests that distribution module 400 provides such a subsidy to the user. In one embodiment, distribution module 400 simply mails a product such as a print consumable or other product such as the type described above to a user at the address specified in the user profile. In another embodiment, distribution module 400 mails or electronically generates a coupon that the user can use to receive a free or discounted product of the type described above. Regardless of whether block 1800 is answered affirmatively or negatively, flow of control then returns back to block 1300 (Fig. 2) to see if another document has been requested from the printing module 380.

- Referring again to Fig. 3, after block 2900 informs document server 100 that the document printed successfully, flow of control moves to block 4100 (Fig. 4), which checks with document server 100 to see what the current version of printing module 380 is. Block 3100 checks to see whether such a request has been received, and when it is, block 3200 sends information concerning the current version of the printing module to printing module 380. Block 4200 compares this information from document server 100 with its own version and determines whether an updated version of printing module is available. For example, if printing module 380 is running version 4.0, and document server 100 indicates that version 4.1 is the current version of

- printing module 380, block 4200 would determine that an updated version of printing module 380 is available, and flow control would move to block 4300. Block 4300 checks to see whether this updated version of printing module 380 should be requested to be downloaded. While a user would typically be
- 5 asked whether such a download should be requested or not, and would typically perform this download at a convenient time, such a step could also be performed automatically without user intervention. If such a download is requested, block 4400 is answered affirmatively, and block 3500 downloads the updated printing module, which is then installed in block 4500.
- 10 Regardless of how blocks 4200 and 4300 are answered, flow of control moves to block 4600, which checks to see if a disconnected state should be entered. If block 2300 (Fig. 2) determined that device 300 was in a disconnected state when the document was requested, as discussed above (i.e., not operatively coupled to network 200), block 4600 is answered
- 15 affirmatively, and block 4700 reenters the disconnected state. In any event, flow of control returns to block 2200 of Fig. 2.

- Referring again to print schedule 390 shown in Fig. 7, it can be seen that many different types of documents can be requested to be printed. For example, the title of document 11000 specifies a network address, such as an
- 20 Internet Uniform Resource Locator (URL) that contains the network location of a document to be printed. Note that this URL may be partially or completely hidden from the user, as is the case with the URL for document 15000 (<http://www.beloitdailynews.com>). In this scenario, edit module 120 of document server 100 merely goes out to the Internet at the URL indicated
- 25 (which would be shown in Fig. 1 as one of the content providers 50), and captures the indicated document, which is then transmitted to a printing device via transmission module 150 and printing module 380, as has been discussed. Alternatively, device 300 could go directly out to the URL itself without assistance from document server 100; in this case, block 2300 (Fig. 2)
- 30 requests document 11000 from another source – directly from the content provider 50 (at the indicated URL) via network 200.

In contrast, document 12000 is not a document that originates with a content provider 50 via the Internet, but instead is stored directly on device 300, such as a printing device, personal computer, or other electronic device. An example of such a document could be a daily calendar from a program such as Microsoft Outlook, which the user has requested be printed automatically to his printer, without any user intervention, at 7:00 a.m. every weekday morning. In such an embodiment, printing module 380 does not need to request the document from document server 100, since it can access the documents without going through network 200. In this embodiment, block 2300 of Fig. 2 requests the document from another source – device 300. While block 2900 would still preferably indicate that the document was printed, and while block 1700 would still preferably update the user profile in knowledge module 170, printing such a document would preferably not generate any type of credit towards a product subsidy, since such a document would not be considered a “preferred” document, e.g., not a document under the control of edit module 120.

Referring again to Fig. 7, a print schedule of document 13000 is shown. Document 13000 is referred to as a “personalized document”. Such a personalized document is a document that is assembled by edit module 120 of document server 100 from a variety of content providers 50 and advertising providers 80, based on information contained in the user profile stored in knowledge module 170. For example, document 13000 is a personalized document. Our user has requested that document 13000 – his personalized newspaper – be printed at 6:00 a.m. every day. Edit module 120 examines the user’s interests as specified in the user profile stored in knowledge module 170 to assemble the document from selected content providers 50 in which the user has indicated an interest. Edit module 120 also inserts advertising from selected advertising providers 80 – again based on the user profile stored in knowledge module 170.

Fig. 8 shows how the print schedule 390 of Fig. 7 can be edited by the user. The user can use the publisher’s recommended schedule, use a default schedule the user has set, or use a custom schedule for delivery. If a



custom schedule is selected, the user can select a daily, weekly, or monthly delivery, or select a delivery once every specified number of days, or specify every weekday. In addition, the time of day can also be specified: once at a designated time, multiple times during the day, or multiple times separated by a specified period of time. While not shown here, the user could also edit print schedule 390 to request that a document be sent upon creation, or upon the occurrence of an external event.

Figs. 9A-9B show document 11000 printed by the printing device according to one embodiment of the invention. Note that this document came from one content provider 50 via network 200 (either through document server 100 or directly), and contains no advertising. While document 11000 is preferably formatted by content provider 50 such that the information contained in the document is optimized to be printed, such formatting is not necessary.

Fig. 10 shows document 12000 printed by the printing device according to one embodiment of the invention. Note that this document is a user's daily calendar which came directly from device 300 and not from document server 100 via network 200.

Figs. 11A-D show document 1300 printed by the printing device according to one embodiment of the invention. Note that this document is a user's personalized newspaper which contains information in which the user has indicated a specific interest in, as stored in the user profile in knowledge module 170. Note also that this document contains advertising that edit module 120 determined the user would also be interested in, again based on the information contained in the user profile stored in knowledge module 170. As has already been discussed, when the user prints a sufficient number of such "preferred" documents, the user may receive a product subsidy of a print consumable or other product(s).

Fig. 12 shows document 14000 printed by the printing device according to one embodiment of the present invention. Note that document 14000 is the "Instant Delivery Times" – a document located on document server 100. While this document does not contain advertising per se, it is still considered

to be a preferred document, since it is under the control of edit module 120. Document 14000 informs users of Instant Delivery of new releases or new information about the Instant Delivery service.

Having introduced an example document delivery system architecture and associated operational methods above, attention is now drawn to Figs. 16-19, wherein another aspect of the invention is presented. More particularly, Figs. 16-19 introduce a system and related methods for dynamically generating and delivery personalized activity publications, in accordance with one aspect of the present invention.

As introduced above, edit module 120 of document delivery server 100 dynamically generates personalized publications from content assembled from one or more content providers 50, 80 based, at least in part, on special interests denoted in a publication profile. It will be appreciated that the look, feel, and style of the publication largely depends on the informational interest of the user, determined from one or more of the publication profile, user profile, etc. In this regard, as a subset of personalized publications, edit module 120 may well generate personalized activity publications to satisfy user requests. As used herein, personalized activity publications are intended to include a wide range of publications intended to educate and/or instruct, and which are formatted to include a instructor subset of content and a student subset of content. According to one implementation, the student subset of content includes interactive content. The content of the personalized activity publication is dynamically chosen by edit module 120 to satisfy at least a subset of topics of a lesson plan, which may be manually or automatically generated. An example method for generating such personalized activity publications is presented with reference to Fig. 16, in accordance with one aspect of the present invention.

In accordance with the illustrated example embodiment of Fig. 16, an example method for publishing a personalized activity publication is presented, in accordance with one aspect of the present invention. As shown, the method begins with block 16002 wherein edit module 120 receives an indication to publish a personalized activity publication. As introduced above,

this indication may well be received from a print module 380 based, at least in part, on a print schedule 390 denoting that it is time to publish a periodically published personalized activity publication. Alternatively, the indication may be received from a document server 100, in response to a request received  
5 from a client computing system (e.g., via a user interface executing on the client computer).

In response, edit module 120 attempts to identify a lesson plan associated with the requesting user, block 16004. If a lesson plan cannot be identified, edit module 120 prompts the user as to whether they wish to  
10 manually generate a lesson plan, block 16006. More particularly, in accordance with one example embodiment, edit module 120 selectively invokes an instance of personalized activity publication tool(s) 513, which determines whether the user wants to manually generate a lesson plan, or whether the user wants the document delivery system to generate a proposed  
15 lesson plan based on one or more attributes of the requesting user or the user's intended audience, in block 16008.

If, in block 16008, personalized activity publication tool 513 receives an indication that the user wants to manually generate a lesson plan, publication tool 513 provides the user with a user interface comprising a list of suggested  
20 topics, and also with a field in which the user can input their own topic(s), block 16010. According to one implementation, publication tool 513 obtains a list of activity topics from one or more of educational development profile 650, content provider(s) 50, 80, and the like. According to one implementation, personalized activity publication tool 513 selects certain of a plurality of  
25 activity topics for presentation to the user based, at least in part, on information contained in one or more of user profile, publication profile, etc.

In block 16012, edit module 120 receives user topic selections, from which a lesson plan is generated. According to one example implementation, publication tool 513 dynamically generates a lesson plan for a requesting  
30 user, and appends the lesson plan to information contained within the user profile. In accordance with an alternate implementation, publication tool 513 generates a lesson plan associated with a user which is stored as a

publication profile 640 associated with the personalized activity publication of the user. In either case, the lesson plan is utilized by edit module 120 to dynamically generate the personalized activity publication for subsequent delivery to at least the requesting user.

- 5           Returning to block 16008, if publication tool 513 receives an indication that the user does not want to manually generate a lesson plan, publication tool itself will generate a lesson plan, block 16014. More particularly, in accordance with one example implementation, personalized activity publication tool 513 automatically identifies lesson plan topics based, at least
- 10 in part, on information contained in one or more of the user profile, publication profile, education development profile, and the like. For purposes of illustration, and not limitation, personalized activity publication tool 513 may request the user for additional information such as, for example, demographic information describing the intended audience (e.g., a five year-old boy).
- 15 Based on such information, publication tool 513 scours the educational development profile 650, and content currently available from one or more content providers 50, 80 to develop a list of lesson plan topics which are designed to be educational (i.e., build confidence, improve skill level/performance, re-emphasize school subjects, introduce new subjects)
- 20 and/or entertaining. According to one embodiment, the educational development profile 650 is created by experts in each of a number of fields such as, academia, child development, sports, youth groups, counselors and the like.

- 25           In block 16016, personalized activity publication tool 513 dynamically generates a proposed lesson plan based, at least in part, on the topics identified in block 16014. According to one implementation, the proposed lesson plan is presented to the requesting user for certification before implementation, wherein the user may change one or more aspects of the lesson plan to suit their individual objectives. Alternatively, the instructor,
- 30 parent, coach may utilize the tool 513 to reject the proposed lesson plan requesting the tool to generate another lesson plan, or utilize the tool to

manually assemble material from one or more content providers 50,80 to generate the personalized activity publication.

5 In block 16018, a publication schedule for the personalized activity publication is established. According to one implementation, the publication schedule is generated by publication tool 513 in response to user input. Alternatively, a publication schedule may be generated in accordance with content publication schedule(s) provided by the one or more content providers 50, 80 which contribute material to the personalized activity publication.

10 In block 16020, edit module 120 assembles content to publish the personalized activity publication. In accordance with the teachings of the present invention, edit module 120 selects material for inclusion in the publication which satisfy at least a subset of the generated lesson plan.

15 In block 16022, edit module 120 formats content selectively assembled from one or more content providers 50, 80 to publish the personalized activity publication. In accordance with one embodiment, edit module 120 formats the publication to include an instructor subset of content and a student subset of content. According to one implementation, the instructor subset of content is presented on the first page of the publication, while the student content is presented on the second and subsequent pages of the publication. In accordance with one implementation, the instructor subset of content is only presented in an instructor version of the publication, wherein versions of the publication to be delivered to others does not include the instructor subset of content. In either case, as edit module completes publication of a personalized activity publication targeted to satisfy at least a subset of the lesson plan, edit module 120 updates the lesson plan to denote which topics have been covered.

25 In block 16026, edit module 120 forwards the publication to transmission module 150 for delivery to at least the requesting user. According to one embodiment, a user may specify additional recipients of the personalized activity publication in, for example, the user profile, publication profile, lesson plan, etc. In accordance with such an embodiment, transmission module sends at least the instructor subset of content to the

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requesting user, and at least the student subset of content to the other denoted recipients of the personalized activity publication.

Turning to Fig. 17, a graphical illustration of an example lesson plan is presented, according to one aspect of the present invention. In accordance with the illustrated example embodiment of Fig. 17, a lesson plan targeted to parents and preschoolers (2-6 years) is presented. As shown, the lesson plan denotes publication Monday through Saturday although other publication dates and aggregations may be set (including the instructor cover page). From this lesson plan, a print schedule 390 may be developed, wherein an actual time for publication and delivery is further noted.

As shown, the requesting user (presumably, the parent or day-care provider) will receive a cover page of instructor content for each instance of the personalized activity publication. The cover page is targeted for the parent/instructor/coach with content describing the nature and objectives of the student subset of content. In accordance with one example implementation, the cover page may also include targeted advertising associated with content presented in the personalized publication. In accordance with one implementation of the present invention, advertising only appears, if at all, in the instructor subset of content. In alternate embodiments, advertising may be selectively placed throughout the personalized activity publication.

In addition to the cover page, the personalized activity publication includes student subset of content. In accordance with the illustrated example implementation, the student subset of content may well include one or more of coloring printables, a treasure map, activities, paper games, recipes, and the like. The coloring printables feature characters with numbers, letters, shapes, safety, magazine coloring pages, and the like. Similarly, the activities, paper games, recipes and other content is designed to educational, instructional as well as entertaining. Activities may be targeted towards arts and crafts, sports, and the like. According to one aspect of the present invention, the content of the individual elements of the personalized activity publication carry common threads, designed to instruct and reinforce each other to better

educate the child. To illustrate this point, an example personalized activity publication published during Black History Month may begin with a story about Althea Gibson, followed by a coloring page of a picture of Ms. Gibson and activities for developing motor skills with a tennis ball. In this way, each of the activities reinforces the educational theme/topic of the lesson. In alternate embodiments, personalized activity publications may be generated which promote skills building for individual and team sports, musicianship, civics, and the like.

Fig. 18 illustrates an example layout of a personalized activity publication, in accordance with one embodiment. In accordance with the illustrated example embodiment of Fig. 18, a personalized activity publication format 18000 is presented comprising an instructor subset of content 18002 and a student subset of content 18004. According to one implementation, the instructor subset of content 18002 comprises a cover page of the personalized activity publication, while the student subset of content comprises subsequent pages of content 18004A...N. In alternate embodiments, alternate formats may well be used wherein the instructor subset of content and the student subset of content are commingled on one or more of the pages of the personalized activity publication.

Fig. 19 illustrates a block diagram of an example storage medium comprising a plurality of executable instructions including at least a subset of which that, when executed, implement an edit module according to Fig. 14. As used herein, storage medium 19000 is intended to represent any of a number of storage devices and/or storage media known to those skilled in the art such as, for example, volatile memory devices, non-volatile memory devices, magnetic storage media, optical storage media, and the like. Similarly, the executable instructions are intended to reflect any of a number of software languages known in the art such as, for example, C++, Visual Basic, Hypertext Markup Language (HTML), Java, eXtensible Markup Language (XML), and the like. Accordingly, the software implementation of Fig. 19 is to be regarded as illustrative, as alternate storage media and software embodiments are anticipated.